

RAE SELLING BERRY SEED BANK & PLANT CONSERVATION PROGRAM



Fall 2012 Newsletter

From the Director



We're approaching the end of our first year here at Portland State University as the Rae Selling Berry Seed Bank & Plant Conservation Program in the Department of Environmental Science and Management. We are settling comfortably into our new space, which is well suited to our needs (I still miss the garden view!). We have not only landed on our feet, but have made significant progress in key areas that will have dramatic payoffs in the months and years ahead.

Foremost among these is the realization of a long-time dream, which is to have a sophisticated computerized mapping program. We are also closing in on realizing a second dream: a flexible and very powerful relational database. In addition, we have begun to add to our rare plant work a focus on common species. Kris Freitag and the high school interns covered a lot of ground this spring and summer, as our part of the BLM's national **Seeds of Success** program, gathering species new to the seed bank. I myself was fortunate to be able to spend a couple of days in Colorado reviewing the Alpine Garden of the Denver Botanic Garden, and more than a week in Taiwan, both conservation related trips.

We have for many years wanted to be able to visualize our veritable mountain of seed collection data, both to evaluate seed bank holdings against what is out there and also to use as a planning tool for future collections. With resources available at PSU (mapping software and IT support), and assistance from a skilled and very generous volunteer intern, Kara Manseau, we now have a functional mapping capability. I knew having such capacity would help us do our work more efficiently, but the reality is more transformative than I had imagined. For example, with the new ArcGIS software, we can combine our collection information with the tremendous body of spatial data available on the web and learn many new things about our collections, such as the underlying geology or soil types of each collection site.

Kara has been instrumental in sifting through 30 years of collection data to digitize our diverse location information, and she has begun to produce maps in a variety of formats. In addition to making the kinds of maps we need, she has also written a series of tutorials to allow even novices such as myself to make new maps. It is hard to convey the importance of this advance. When the new database is finalized, the possibilities are truly inspirational!

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Making a Difference

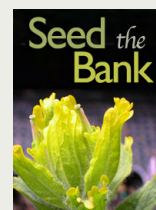
Volunteering

Your support helps us to do our best work.

Please call Kris at (503) 725-2468 or email kfreitag@pdx.edu if you would like to support our program.

Make A Gift Today

GIVE ►



Stay up-to-date with the Seed Bank on our Facebook page!

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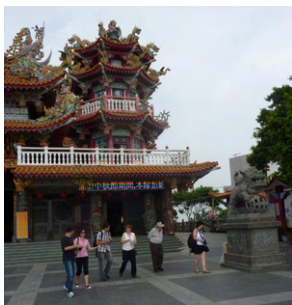
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Taiwan investigates national seed bank

Ed Guerrant



Pat & Peter Raven
with Taiwan colleagues

In late September, I was honored to participate in a conference in Taiwan, the 2012 International Symposium on Collection and Conservation of Plant Genetic Resources. Taiwanese scientists and conservationists have been working toward establishing a national seed bank, and this conference was conceived and organized to aid them in that effort.

It was one of the best scientific symposia in which I've participated, both for the content and because there was plenty of time for the participants to get to know each other. There were two days of presentations, and three additional days for field trips and long bus rides. A number of experts gathered from the USA, England, Australia and South Africa, as well as from China and Taiwan.

The first day of the symposium, titled Modern Seed Banks: The Enhanced Role of Cryopreservation, was held at the National Cheng Kung University in Tainan City, located in the lowlands of southwest Taiwan. It was largely dedicated to the science of seed storage physiology, particularly storage of seeds at the ultra-cold temperatures associated with liquid nitrogen (close to -200°C). The success of the Berry seed bank has been facilitated by the overwhelming presence of 'orthodox' seeds in the Pacific Northwest. These are seeds that can survive desiccation to the point where there is no liquid to form ice crystals when they are frozen for long term storage. In Taiwan's moist, warm climate, many more plants produce 'recalcitrant' seeds, which are very vulnerable to desiccation.

One nugget I picked up, after all the years I've been in this field, is a simple and clear explanation of why seeds of some species tolerate extreme dryness and others don't. It has to do with the amount of dry matter in the cells: those with lots of solid contents (starch, etc.) don't shrink as much. It is physical or mechanical damage associated with cell shrinkage that is apparently a significant factor in whether a seed can survive extreme dryness.



Cheng Kung University
Institute of Biodiversity



Kunming Institute of Botany

The first day also featured Dr. Paul Smith, Head of the **Millennium Seed Bank (MSB)**, Royal Botanic Gardens, Kew, England. He outlined their work as the hub of a consortium of 120 institutions in 50 countries around the world, a project called the Millennium Seed Bank Partnership. Their goal is to store samples of 25% of the world's seed plant species by 2025. Building local capacity in partner countries is central to their strategy. For example, for several years

MSB has been working with the **Kunming Institute of Botany**, in Yunnan Province, China, to develop China's Germplasm Bank of Wild Species. The partnership benefits both countries, as a portion of collected samples is sent to England for storage.

The next day we visited a mangrove swamp in the vicinity

Wide World of Seed Banking

OTHER LINKS

6th Annual International Conference on Business and Sustainability, Nov. 7-9

Mount Rainier's avalanche lilies could teach us about climate change

Rocky Barker: Confront 'Noah's Choice' or keep arguing?

European mountain vegetation shows effects of warmer climate

Plant diversity is key to maintaining productive vegetation

Native species fight back: first evidence of coevolution between invasive, native species

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of an ornate Taoist temple. We also visited one of the main winter feeding areas of the extremely rare black faced spoonbill. These wetlands do double duty the rest of the year in commercial fish production. (In one of the ironies of modern life, the spoonbill's primary breeding grounds are protected by their location off the west coast of North Korea, near the demilitarized zone.) We then headed north into the central mountain range and the headquarters of the Taiwan Endemic Species Research Institute (TESRI).



*Black-faced Spoonbill
Ecology
Exhibition Hall*



*Taiwan Endemic Species
Research Institute*

The following morning, the first session of Part Two of the conference featured four speakers from Taiwan, including Dr. Chang-Hung Chou who laid out the impact of climate change on alpine diversity in Taiwan, and Dr. Chyi-Rong Chiou, who summarized the results of an almost decade long effort to map the vegetation of Taiwan. The afternoon session included a presentation by Dr. De-Zhu Li, Director of the Kunming Institute of Botany's Germplasm Bank of Wild Species and China's Strategy for Plant Conservation. I

gave the final presentation, "Sampling for Effective Plant Conservation." In addition to any assistance it might give the Taiwanese, my assigned topic allowed me to explore issues in depth that will be of value in our efforts to gather seeds of common species and eventually to establish what we are provisionally calling the Oregon Ecoregions Seed Bank.

The Oregon Ecoregions Seed Bank will focus on common species, though in many other ways it will resemble the Berry Botanic Garden Seed Bank. Almost from the beginning, the Berry Seed Bank has been part of the [Center for Plant Conservation \(CPC\)](#), a national consortium of (now) 39 regional botanical organizations, which seeks to conserve America's rarest plants. I would like to see an Oregon Ecoregions Seed Bank become one of a similar network of regional seed banks, with an organization like the CPC, which provides a professional community that benefits all who participate, to unite them into a larger whole. The Seeds of Success program, with its longstanding partnerships, seems a likely candidate to form such a community and to coordinate the shared work of these regional organizations.



Taipei Botanical Garden

Plant conservation is, to put it lightly, a team sport. The seed bank work we've done for almost 30 years has been done in partnership with federal and state agencies and non-governmental organizations. It has always been one part of a larger conservation community. This symposium offered a glimpse of an even larger network of seed banks, each working independently, but associated with and backing up their collections in a global partnership.

I received an email shortly after the conference: the relevant high level government officials have signaled that the Taiwan national seed bank project can now begin in earnest!

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The Fascination of Seeds



Thimbleberry,
Rubus parviflorus

Summer intern Helena Klein worked with Dr Guerrant to photograph our Seeds of Success collections, revealing the natural artistry of seed structure and topography. These images offer a glimpse of our growing collection of seed images.

We are reminded again of what never fails to thrill--when there seems to be nothing new under the sun, a different perspective on the everyday gives us something new and rich.



Pacific waterleaf,
Hydrophyllum tenuipes



Rosy plectritis,
Plectritis congesta

Along with fellow high-school student Danielle Bernardini, Helena appreciated the chance to see Nature close-up in this way. Both students at Grant High School, the young women interned through [Saturday Academy's Apprenticeships in Science & Engineering \(ASE\)](#). Alternating field trips with Kris and work in the lab, Danni and Helena had a wide range of experiences in the two months they were with us.

They were able to experience one of the fascinating things about what we do--the glimpse into rarely noticed details of a plant's life. One plant may bloom so quickly there is little time to be aware of its presence, and then release all of its seed at once, exploding or scattering it or sending winged seed into the sky. Another may have a long season with one colorful flower at a time blooming along a tall spike, and then slowly crack open its capsule to the sky, holding onto its seeds while wind and wildlife gradually shake them out.



ASE interns, Danni Bernardini (L) and Helena Klein

Danni and Helena also worked with GIS volunteer Kara Manseau, entering plant data, making maps and testing out Kara's excellent tutorials. As the interns said about their internship in their tag-team final presentation, "It's been a very valuable experience and a perfect way to spend the summer."



Gray's biscuitroot,
Lomatium grayi var. grayi

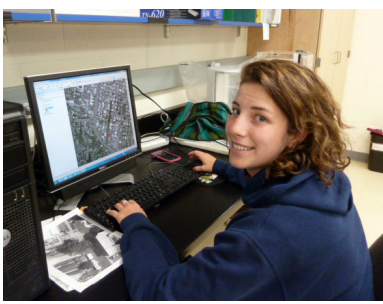


Common snowberry,
Symphoricarpos albus



Pacific popcornflower,
Plagiobothrys tenellus

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Kara Manseau at the computer

Volunteer takes on GIS challenge

Volunteer Kara Manseau has been with the Berry Seed Bank for over four months, starting almost immediately after she graduated from Oregon State University with a Bachelor of Science in Geography and a certificate in Geographic Information Science, which included study of **geographic information systems (GIS)**.

A geographic information system lets us visualize, analyze, interpret, and understand data to reveal relationships, patterns, and trends. An increasing number of fields, from epidemiology to natural resource management to city planning use GIS. Kara plans to work for a year or so in order to decide which field most interests her. As a volunteer at the Seed Bank, she has been working here nearly full time, as dedicated as paid staff, and she recently started a paying job part-time, so that she can continue this project.

As part of a class entitled "Resource Development in the Third World," Kara learned about seed banks as tools for preserving agricultural and cultural resources. A friend of the Guerrant family, Kara found out about our need for someone knowledgeable in GIS to make our collection data more accessible for our use and that of our partners in conservation. She readily volunteered for the challenge.

What she found was a complex and intriguing project. We have been collecting seeds for almost 30 years, and other individuals and organizations have been tracking populations in this region for much longer. Each collection is given a unique accession number, which we use to keep track of the data about that collection, such as location and details of population and habitat. We have obtained additional data from organizations such as the Oregon Biodiversity Information Center and Washington State Department of Natural Resources, encompassing all known populations of rare plants in Oregon and Washington.

With the ArcGIS software, we are able to create individualized maps in which we can view our collections in the context of all known populations of each species, against a backdrop of a variety of base maps. We can also add in maps showing soil characteristics or geology, for example, and thus learn new things about our collections. As we are able to actually look at what all the numbers mean in the landscape, we are able to see patterns that were hidden before.

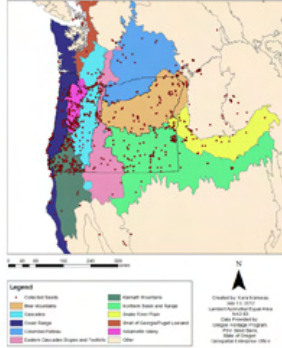
Dr. Guerrant has provided guidance to target Kara's efforts toward our desired goals. With her training in ArcGIS and introduction to what we do and how we'd like to view results, she has been able to learn as she goes, manipulating data more efficiently to create maps that will in turn increase our effectiveness in conserving native flora. As her and our knowledge increases, we are able to produce ever more informative and elegant maps, including valuable data that has not been readily accessible.

Kara found that construction of the complex and multilayered maps enabled by GIS software satisfies her need for a creative outlet. "I thought about studying architecture. I find GIS to be kind of the same thing--a meshing of the technical and artistic," she says.

And, importantly, she is teaching us the basics and has written a series of tutorials so we can continue when she, regrettably for us, moves on to a new challenge.

Mapping Our Collections

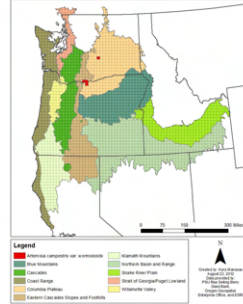
Location of Collected Seeds



Ecoregion map of all Berry Seed Bank collections

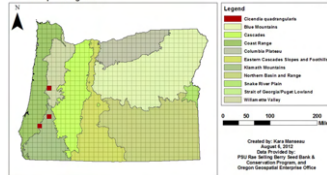
We can now "see" how much work we have been doing! Eventually we will have maps on our web site so you can too. (The maps we publish will not be too specific, so as not to divulge sensitive locality information.) Here is a selection of maps that we have been working on. They will allow us to evaluate the collection for coverage and strategically plan future collections.

Artemisia campestris var. wormskioldii



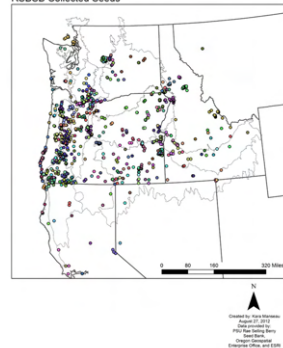
Ecoregion map of Artemisia campestris var. wormskioldii collections

Cicendia quadrangularis



State ecoregion map of Cicendia quadrangularis collections

RSSB Collected Seeds



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Region map of all Berry Seed Bank collections



Keith Nevison receiving award

Berry volunteers connect

Volunteer **Keith Nevison** recently graduated *cum laude* with a Bachelor of Science in Environmental Studies with a Geography minor. He received the student PSU Sustainability Award from President Wim Wievel in the spring. Shortly thereafter he became the full-time Green Space Specialist with **Friends of Trees**.

last school year, while she studies Botany through the Biology Department. Currently she is volunteering in the lab of the Biology Department's **Dr. Daniel Ballhorn**, right down the hall from ours. Dr. Ballhorn's group studies interactions between plants and herbivores/microbes. Anna Maria assists a graduate student identifying and studying fungal endophytes of Oregon white oak leaves. She is learning to extract DNA for study.

Alex Stauch is currently earning a Masters in Environmental Management. He is also Project Coordinator for the **Blue Heron Wetlands Restoration Project**. He is in a crucial struggle with a new invader: "My main goal is to eradicate the invasive hydrophyte *Ludwigia peploides*. I am carrying out a field experiment comparing different eradication methods and also implicating an active eradication plan."

Anna Maria Dettmer volunteered for us

Making a Difference - Private Support

Thank you to our supporters for over \$4,000 donated recently to our program. You made it more than possible for us to have Danielle Bernardini and Helena Klein as our ASE interns this summer.



Individuals make the difference

We would again like to acknowledge philanthropist **John Gray** for his decades of support to the Berry Botanic Garden and his timely matching grant that made such a difference in our transition to PSU.

Mr. Gray passed away on October 19 after a very full and generous life. Our condolences to his family for the loss of this special individual.

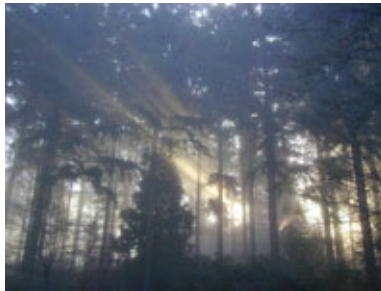
Private gifts and grants make all the difference in the life of our program. You can go directly to our [giving page](#) or for more information on ways to make a gift, please contact Paul Mortimer, Assistant Dean for External Relations in the College of Liberal Arts & Sciences, at 503-725-9894 or pmortimer@pdx.edu.

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Upcoming Events

Forest Ecology & Management Seminar: Disturbance and management effects on carbon storage on forest lands in the Pacific Northwest

Andrew Gray, US Forest Service
Wednesday, November 7 - 4:00 p.m.
[Cramer Hall 71](#), PSU
Free and open to the public



Held Wednesday afternoons in October and November, The Forest Ecology & Management Seminar is a collaborative effort between the PSU Environmental Science and Management Department and the US Forest Service Pacific Northwest Research Station. Researchers from PSU, USFS, non-profit organizations, and timber management companies present and discuss their current research.

[Seminar schedule](#) >>

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Urban Weed Control Workshop

Dominic Maze & Samuel Leininger
Wednesday, November 14 - 6:30-8:00 p.m.
Oregon Trail Interpretive Center, 1726 Washington St, Oregon City
Free and open to the public

The class will focus on control methods including cultural, mechanical, chemical, and biological control methods to target the least favorite plants invading your urban homestead. This event will feature Dominic Maze, Invasive Species Coordinator from the City of Portland, and Samuel Leininger, WeedWise Program Manager for Clackamas SWCD. They will discuss how to identify, eradicate and prevent your common garden weeds.

[More details>>](#)

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Presentation: Native Landscaping and Wildlife by Dr. Doug Tallamy

Thursday, November 15 - 10:15 a.m.

Portland Garden Club, 1132 SW Vista Ave

Free and open to the public

Have you noticed fewer butterflies flitting around your garden in recent summers? Well, so has our speaker, Dr. Doug Tallamy, Professor and Chair of the Department of Entomology at the University of Delaware in Newark, N.J., and the author of *Bringing Nature Home: How Native Plants Sustain Wildlife in Our Gardens*.



Lorquin's admiral butterfly emerging

Dr. Tallamy believes that the loss of insects (it's not only the butterflies) is the beginning of a series of unforeseen and unfortunate events: insects nourish our other garden visitors like frogs and song birds either directly or indirectly. Too many gardeners, he believes, adhere to the unsustainable esthetic of broad grassy lawns, non-native species and "pest"-free ornamentals. Our speaker will present his case for native gardening and tell us how to create more sustainable habitats for our six-legged friends.

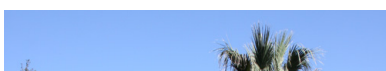
Please join your two-legged friends and consider inviting a guest to the Garden Club on Thursday, November 15, to hear Dr. Tallamy present his case for native gardening.

[More about Dr. Tallamy>>](#)

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The Wide World of Seed Banking

Saving seeds for future use is as old as human civilization and as timely as today's headlines. Our focus has been on rare and endangered species, but the world of seed banking is far more expansive. It probably began with storing seed for next year's crop, and agricultural plants are likely still the most common focus of seed banks around the world. But recent decades have seen an explosion of seed banking of a much wider array of plants for many different purposes. In this section, we seek to provide a glimpse of the wide and wonderful world of seed banks, often in their own words.



In Our Region: Rancho Santa Ana



Botanic Garden

The mission of the Rancho Santa Ana Botanic Garden is to make significant contributions to the appreciation, enjoyment, conservation, understanding and thoughtful utilization of California's natural botanical heritage. The primary function of RSABG's Seed Conservation Program is the curation and management of the Garden's extensive seed collection. The collection is comprised of over 4,200 accessions representing more than 1,500 California native

plant species and cultivars. These collections serve a diverse community in the conservation, botanical, research, education and horticultural fields.

[Continue reading at the RSABG Seed Conservation site>>](#)

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In Our Country: Dixon National Tallgrass Prairie Seed Bank



A single seed holds the potential for a living and functioning plant. A seed bank preserves this potential for up to 200 years by reducing the internal moisture of seeds and then



Kay Havens, Director,
Plant Science and Conservation,
Chicago Botanic Garden

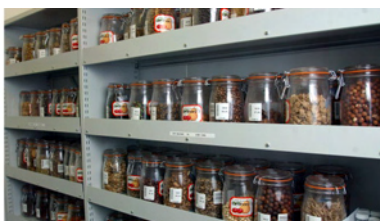
freezing them. The Dixon National Tallgrass Prairie Seed Bank is the only seed bank in the world that focuses conservation

efforts on the native species of the tallgrass prairie, one of the most endangered habitats in the world.

The Dixon National Tallgrass Prairie Seed Bank at the Chicago Botanic Garden takes the long view of plant conservation. They collect species with high restoration importance from each of the ecoregions of the tallgrass prairie system, thus serving as a valuable restoration collection for conservation purposes and as a resource for a wide community of scientists and land managers.

[Continue reading at the Dixon National Tallgrass Prairie Seed Bank site>>](#)

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*Millennium Seed Bank at the
Royal Botanic Gardens, Kew*

Millennium Seed Bank at the Royal Botanic Gardens, Kew: Partnership

In 2009, the Millennium Seed Bank Partnership (MSBP) - a network of 120 partners in 54 countries (including Seeds of Success in the U.S.) - hit its first target of collecting and banking seed from 10 per cent of the world's wild plants in just 10 years. That success is testament to the power of the

partnership and makes them confident they can achieve still more in the next 10 years: by 2020 they will have seed from a quarter of all the world's wild plant species in safe storage.

Their priorities are useful species and plants most threatened by changing climate - those from drylands and islands, mountains and coastal regions - and from parts of the world where there are large gaps in our collections. The MSBP isn't only about safeguarding seed for the future but about helping solve some of the world's most pressing problems through the use of plants.

[Continue reading at the Millennium Seed Bank site>>](#)

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Stay informed on upcoming events and news by regularly visiting the [Rae Selling Berry Seed Bank web site](#).

This e-newsletter is a publication of the Rae Selling Berry Seed Bank & Plant Conservation Program at Portland State University

